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Multilateralization of the nuclear fuel cycle: increasing transparency and sustainable security

Working paper submitted by Austria

This paper elaborates on a food-for-thought paper submitted by Austria to the Preparatory Committee at its first session (NPT/CONF.2010/PC.I/7).

I. Introduction

1. Article IV of the Treaty on the Non-Proliferation of Nuclear Weapons establishes the "inalienable right" of all the parties to the Treaty to "... use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty". In exercise of this right, several States have opted to include nuclear power in their energy mix. After decades of decline, experts predict that overall global nuclear power capacity might increase in the coming years.

2. Because of its inherent dangers, nuclear technology continues to represent the potentially most destructive threat to global security. Every expansion in the use of nuclear power leads to the spread of fuel cycle services, thus increasing the risk of misuse for non-peaceful purposes, whether by States or non-State actors. The anticipated rise in demand for fuel cycle services, as well as the associated risks of weapon proliferation, nuclear terrorism, illicit trafficking, and accidents involving radioactive materials, requires new frameworks for reducing the threat of misuse — or careless use — of nuclear energy.

3. As we strive for the complete elimination of nuclear weapons, and as this goal begins to see reflection in the official policies of nuclear-weapon States, the need for a long-term vision to address non-proliferation concerns gains increasing urgency. Given the mutually reinforcing nature of disarmament and non-proliferation efforts, it is vital to ensure that any progress towards disarmament of nuclear weapons is not hindered in any way by concerns over non-proliferation.

4. Legitimate concerns of States which rely on nuclear energy regarding the supply of fuel for their reactors need to be addressed, as well as concerns regarding misuse and proliferation. In today's world, international challenges can be solved

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only by close cooperation and inclusive, transparent and verifiable multilateral systems. The crisis of confidence and mutual mistrust on nuclear issues requires a bold new approach to the nuclear fuel cycle.

5. Several proposals have been made. Building on work done in the past, the International Atomic Energy Agency (IAEA) and its Director General, Mohamed ElBaradei, have been leading the debate and providing the key forum for advancing these proposals.[1] Austria contributed to this debate by presenting a short food-for-thought paper at the first session of the Preparatory Committee in 2007 (NPT/CONF.2010/PC.I/7; circulated at IAEA as INFCIRC/706). The current paper develops some of the ideas further.

II. General outline

6. Multilateralization of the nuclear fuel cycle has the following principal objectives:

- To increase transparency on global nuclear fuel cycle activity.
- To ensure security of supply of nuclear fuel and fuel services for peaceful purposes for those States which have chosen to include nuclear power in their energy mix.
- To increase security for all by addressing various non-proliferation concerns.
- To create conditions which can reinforce efforts towards the complete elimination of nuclear weapons.

7. Austria believes that the interests of all States would be served by the introduction of maximum transparency through a new multilateral framework of supervision of all stages of the nuclear fuel cycle "from the cradle to the grave". Such a framework would better reflect the needs and realities of our global community in the twenty-first century.

8. Concerns have been expressed that some proposals for multilateral approaches to the nuclear fuel cycle might undermine or curtail developing countries' right to the use of nuclear energy for peaceful purposes. It is important to emphasize that the approach outlined here is not an attempt to divide the nuclear community into suppliers and recipients. On the contrary, the proposed framework would ultimately lead to a more comprehensive implementation of article IV, where the benefits of advanced nuclear technologies would be made available to all States that seek them on a fair and equal basis. While the primary motivation for moving towards such a non-discriminatory approach stems from non-proliferation considerations, it is evident that multilateralization of the nuclear fuel cycle could also have considerable advantages in terms of safety, security and cost.

9. The establishment of a multilateral fuel cycle arrangement is likely to be implemented in phases, through various complementary instruments and by different actors. This should be done as part of an agreed framework. Austria's

[1] See in particular the IAEA report entitled *Possible New Framework for the Utilization of Nuclear Energy: Options for Assurance of Supply of Nuclear Fuel* (June 2007), and the Director General's introductory statement to the IAEA Board of Governors, 5 March 2009.

proposed framework seeks to take account of a number of existing proposals, some of which are already at an advanced stage of implementation.

III. Proposal for multilateralization of the nuclear fuel cycle

10. Two parallel tracks would be pursued simultaneously, the first focused on building transparency and mutual confidence, and, crucially, allowing IAEA to build a fully comprehensive picture of each State's nuclear capabilities and activities, and the second setting out steps towards multilateralization of the nuclear fuel cycle.

Track 1: "Cradle to grave" information system for transparency and confidence-building

A. Goal

11. An IAEA "cradle to grave" information system would greatly facilitate the work of the Agency, ensuring that it commands a fully comprehensive picture of the global nuclear industry, and each State's capabilities, activities and transfers, at each stage of the fuel cycle. It would also increase significantly the quantity and quality of information available to States. All States would benefit equally from this system, which would provide greater clarity as to the nature of each State's nuclear activities and thus enhance overall confidence regarding nuclear issues.

B. How and when

12. Much of the information which would form part of the "cradle to grave" information system is already gathered by IAEA for verification and other purposes. This would be drawn together and supplemented, in order to form a complete profile on each State, regardless of its level of nuclear activity. IAEA should be requested to propose a detailed conceptual framework for the information system as soon as possible, taking account of confidentiality requirements.

C. Core elements

13. The information system would comprehensively capture data on all States, through periodic and real-time submission of data.

14. For States with nuclear power programmes or research reactors, the information system would comprehensively capture data on all stages of the nuclear fuel cycle, from the time that nuclear material is mined or imported — in whatever state of processing — to the time that spent fuel is finally disposed of, put into long-term storage or rendered irrecoverable. Nuclear-weapon States would also be required to share initial information on their strategic fuel supplies and strategic facilities, pending agreement on a fissile material cut-off treaty, which is expected to include provisions for full transparency and verification.

15. For States without nuclear power programmes, the system would capture information on any source or special fissionable material held for non-power applications. In addition, some States with ore deposits relevant to nuclear programmes may not have such programmes, but would nonetheless be covered by the system.

16. The type of information which each State would be required to provide includes:

- Periodic information on all national capabilities and operational capacities for each stage of the nuclear fuel cycle, including mining of source material, processing, storage and transport, conversion, enrichment, fuel fabrication, fuel assembly, reactor operation, reprocessing, and disposal and storage of spent fuel and other radioactive waste.
- Real-time information on all national and transnational transactions involving source or special fissionable material and nuclear fuel services.
- Periodic or real-time information, as appropriate, on all activities and transactions relating to non-power applications of nuclear energy.

17. Together with the information currently gathered by IAEA as part of its verification work and pursuant to other mandates and programmes, the additional information obtained through the "cradle to grave" information system would provide IAEA and States with a complete global picture. IAEA would publish a periodic assessment of the global nuclear fuel and fuel services market based on information provided. The resulting transparency — facilitated by the gradual multilateralization envisaged under track 2 — should constitute a significant confidence-building measure.

Track 2: Multilateralization of the nuclear fuel cycle

A. Goal

18. Much of the current mistrust in international affairs has its origin in national nuclear programmes. History has provided ample evidence that cooperative endeavours among States can reduce mistrust by introducing checks and balances. As regards the nuclear fuel cycle, the best way of providing sustainable security for all is by ensuring that States work together in all stages of the cycle. Jointly operated facilities also have the advantage that customer States are not dependent on the national policies of individual provider States. Multilateral facilities can thus provide supply assurances, without calling into question existing article IV rights, while at the same time addressing non-proliferation concerns.

B. How and when

19. The groundwork for multilateralization would begin with the establishment of a nuclear fuel reserve, as a confidence-building measure. At the same time, IAEA would gradually assume the functions of a virtual broker for all fuel cycle-related transactions. Existing facilities would eventually be transformed into new forms of multilateral or regional ownership and new facilities would be established as multilateral facilities from the outset. Finally, a decision would be taken that the rights enshrined in article IV, insofar as they apply to the nuclear fuel cycle, would be exercised exclusively through multilateral endeavours.

C. Core elements

1. Nuclear fuel reserve under IAEA control

20. To immediately address concerns expressed by some States about the potential for disruption of supply of nuclear fuel for political reasons, a nuclear fuel reserve

or bank under IAEA control would be established, as proposed by the Nuclear Threat Initiative and others. The creation of a last-resort reserve of low enriched uranium for States whose supply has been interrupted — and that are in good standing with IAEA — can provide important reassurances.

21. IAEA should be requested to provide a detailed blueprint for the operation of the fuel reserve as soon as possible. Factors to be considered include the following:

- The conditions for accessing fuel from the reserve
- Physical location of the low enriched uranium stocks
- A procedure for determining the price
- Questions related to safety, security and safeguards.

22. The conditions for accessing the low enriched uranium reserve should convince States of the benefits of reliance on multilaterally sourced fuel, rather than domestic development of the full nuclear fuel cycle, without disturbing functional markets. The involvement of IAEA should reassure potential customer States that any decision to supply from the nuclear fuel bank would be taken on a non-discriminatory and non-political basis. Criteria would be established in advance and applied objectively and consistently.

2. *IAEA as virtual broker*

23. In parallel to the decision to establish the "cradle to grave" information system, referred to under track 1, IAEA would be granted the mandate to act as a mandatory virtual broker in all transactions related to the nuclear fuel cycle.

24. The virtual broker arrangements would apply to all transactions involving source or fissionable materials — regardless of the stage of processing — as well as fuel cycle services such as uranium conversion, uranium enrichment, reprocessing, and disposal and storage of spent fuel and other radioactive waste.

25. As a virtual broker, IAEA would not take physical possession or legal title of the nuclear materials or services in question. However, the Agency would be in an optimal position to help to provide assurances of supply to customer States. If a customer were unable to obtain fuel or services from a particular provider, IAEA would be in a position to help to identify alternative suppliers, using information already at its disposal — which would include information on the capacities of each country's facilities at each stage of the fuel cycle — and through pre-agreed standby arrangements. As a last resort, the nuclear fuel reserve would also be available.

3. *Multilateralization of existing nuclear fuel cycle facilities*

26. With regard to existing national facilities, incentives should be provided to encourage broader involvement by interested States, for instance by permitting them to become shareholders, influence strategic decisions at the facilities in question, and share profits and responsibilities. Shareholdings could provide important incentives to States for which guaranteed supply is a primary consideration.

27. Under this model, operation of the plant would continue to lie with the States involved, but safeguards would in all cases be applied by IAEA, to standards at least as high as those for facilities in States with a Comprehensive Safeguards Agreement and an Additional Protocol in force. Additional safeguards measures should also be

considered in recognition of new types of multilateral ownership. IAEA would have a role to play in certifying regional facilities, in order to guarantee high standards of safety and security.

28. In order to avoid any potential conflict with article IV of the Treaty, participation in a multilateral or regional fuel cycle facility would not require a State formally to forgo the right to development of national facilities, but it is expected that the incentive to develop national facilities would be greatly diminished, particularly as confidence grows over time in the ability of a regional facility to satisfy all fuel and fuel service demands. At the same time, the involvement of multiple partners would act as a barrier to "break out" from civil nuclear energy programmes to nuclear weapon programmes.

29. To ensure the smooth operation of regional facilities and reflect new ownership structures, appropriate amendments would be made to national export control legislation, and to the guidelines of relevant export control regimes.

30. Multilateral or regional facilities, such as the International Uranium Enrichment Centre being established by the Russian Federation on the site of the Angarsk Electrolysis Chemicals Complex, are already envisaged. The proposal by Germany for a Multilateral Enrichment Sanctuary Project also provides a model which can serve this purpose.

4. *All new fuel cycle facilities under multilateral control*

31. Newly built fuel cycle facilities would come under compulsory multilateral control from the outset. Agreements with IAEA would ensure the highest verification, safety and security measures.

32. New multilateral facilities should offer a range of nuclear fuel services, both at the front and back ends of the nuclear fuel cycle. Back-end services might be of particular interest to States without the means to dispose of or store waste. As technologies related to reprocessing of spent fuel improve in the coming years, it is expected that new methods for storage and disposal of spent fuel and radioactive waste will be found.

5. *Full multilateralization of all facilities*

33. At the end of the process, all fuel cycle facilities worldwide would be under multilateral control. IAEA verification would become more efficient and less costly, as a number of facilities could be expected to shut down, leading to a more limited number of larger facilities, just as many as global demand requires.

34. A legally binding international instrument would limit the production or reprocessing of all nuclear material for civilian nuclear programmes to facilities under multilateral control. A separate agreement on a verifiable fissile material cut-off treaty would ensure that production of nuclear material for strategic nuclear programmes would also be halted at this stage, if not earlier, allowing strategic facilities to be converted to civilian use under multilateral control, or closed down. These steps would ensure a level playing field for all.

35. Assurances of supply of nuclear fuel would continue to be provided to States in good standing with IAEA, and, in view of the multilateral nature of control, an IAEA fuel reserve would no longer be necessary.

36. Full multilateralization would significantly reduce the threat of proliferation of nuclear weapons through a "break-out" from civil nuclear energy programmes, without dividing the world into "good" and "bad" States, or "haves" and "have-nots". Export control regimes, such as the Nuclear Suppliers Group, would no longer prove necessary once full multilateralization had been achieved.

37. At the back end of the nuclear fuel cycle, multilateral storage facilities would reduce proliferation risks by pooling sensitive nuclear material in a limited number of facilities worldwide, under IAEA safeguards. Multilateralization also has the potential to allow safer and more environmentally sound storage and disposal of spent fuel and radioactive waste, carried out to the highest international standards.

IV. The way forward

38. The debate on multilateral approaches to the nuclear fuel cycle will be enriched in the Treaty review process and at IAEA. Special efforts are required to ensure that States not parties to the Treaty are fully involved in the elaboration of any new framework, and consideration should be given to the convening, at the appropriate time, of a United Nations conference to adopt a framework towards multilateralization of the nuclear fuel cycle.

39. Austria recognizes that the framework presented in this paper is ambitious. But if the upsurge in nuclear power capacity follows forecast trends, then it is important to act now. The broad concept outlined in this submission is not untested. More than 50 years ago, the founding members of the European Union decided to place potentially destabilizing assets — coal and steel — under the supervision of a new supranational and democratic institution, the European Coal and Steel Community, thus ushering in a new era of enduring peace between the participating countries. This model can be applied on a global scale to nuclear technologies and make a significant contribution to peace and security for all.